

ABSTRACT OF THE DISCLOSURE

An improved ignition-engine system for internal combustion engines comprising a compact combustion chamber in the cylinder head and two main squish zones (101a, 101b) for producing high flow and turbulence, and at least one minor squish zone (105) at the end of the intake valve (104), the system using independently operated spark plugs (102a, 102b), placed asymmetrically at or near the edge of the high flow squish zones to handle both ultra-lean light load conditions and high load conditions without misfire or knocking, the engine leanness and high load operation and further improved by using variable compression ratio and/or direct fuel injection, including air-blast fuel injectors (181) and more centrally located air-blast-ignition fuel injector (193) more ideally suited for four valve engines and mild hybrid engines.